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<u>CLAIMS</u>

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What is claimed is:

1. A method comprising:

determining a common neighborhood of users sharing a common activity from a plurality of users; and

predicting for a user in the common neighborhood of users a potential activity from the activities of at least one other user in the common neighborhood of users.

2. The method of claim 1, further comprising:

prefetching data associated with the potential activity for the user.

3. The method of claim 1, further comprising:

recommending an activity to a user that is an activity of a common neighbor of the user.

4. The method of claim 1, wherein the users are associated with internet subscribers and the activities are associated with visits to internet websites.

5. The method of claim 4, further comprising:

prefetching an internet website for the internet subscriber that a common neighbor of the internet subscriber has previously visited;

wherein the prefetching prefetches the information associated with the internet website into a cache accessible by an internet service provider of the user.

6. The method of claim 4, further comprising:

recommending an internet website to an internet subscriber that a common neighbor of the internet subscriber has previously visited.

7. The method of claim 4, further comprising:

recommending a business service corresponding to an internet web site visited by a common neighbor of the internet subscriber.

8. The method of claim 1, wherein the users are associated with phone service subscribers and the activities are associated with phone calls.

9. The method of claim 8, further comprising:

recommending to the user a phone service subscribed to by a common neighbor of the user.

10. The method of claim 9, wherein the phone service is selected from the group consisting of: a long-distance calling plan, a local-area calling plan, a cellular calling plan, voice mail, call waiting, call forwarding, internet service, a pager calling plan, call waiting plan and caller ID plan.

11. The method of claim 8, further comprising :

25

recommending a business service to the user based on at least one phone call placed by a common neighbor of the user to a phone number associated with the business service.

12. The method of claim 11, further comprising:

providing the user the phone number of the recommended business service.

13. The method of claim 8, further comprising:

providing to a business service called by one user of the common neighborhood of users contact information associated with another user of the common neighborhood of users.

14. The method of claim 1, wherein the users are associated with customers and the activities are associated with a plurality of goods or services consumed by the customers.

15. The method of claim 14, wherein the common neighborhood of users defines a market segment.

16. The method of claim 14, further comprising:

monitoring the communications of a common neighbor of the user; and

recommending a business service to the user based on the communications of a common neighbor.

17. The method of claim 1, further comprising:

26

512481_1

monitoring the activities of the users; and

storing the information corresponding to the activities in a memory medium.

18. The method of claim 17, further comprising:

updating the information corresponding to the activities in the memory medium.

19. The method of claim 1, wherein the common neighborhood is determined by:

creating a set H of triples (b,c,v) where b, c, and v are vertices;

sampling randomly a subset of H of a specified size into a set H';

creating a set C of points (a,b) that are a projection of a first two vertices of each triple in set H';

calculating a number of occurrences, N(a,b), for each pair of vertices within the set C; and

sorting the C nondecreasingly by N(a,b),

wherein the set C of points (a,b) represents the users in a common neighborhood, and the set E of edges represents the activities of the users within the common neighborhood.

20.   The method of claim 19, wherein the random sampling is determined by:

creating an adjaceny list E';

calculating a number of arcs connected to each vertex in a set V of vertices;

calculating a prefix sum of a number of pairs of incident arcs N(a) for each node a up to and including a;

generating random numbers uniformly from a set [1..N];

27

512481_1

sorting the generated random numbers into a list R;

initializing a vertex index variable v to 1 and the set H' to the empty set;

incrementing the vertex index variable v by 1 until: $N(v-1) < r <= N(v)$ for each random number r in the list R;

selecting a vertex, a, from a set of vertices $A(v)$ connected to vertex v;

selecting a vertex, b, from a set of vertices $A(v) - \{v\}$ connected to vertex v;

adding a triple (a,b,v) to the set H'; and

determining the set H' when the vertex variable v is greater than a number of nodes N.

21. A method comprising:

determining a common neighborhood of documents sharing at least one common reference; and

predicting for a document of the common neighborhood of documents, a potential reference from the references of at least one other document in the common neighborhood of documents.

22. The method of claim 21, wherein the documents are technical articles.

23. The method of claim 21, wherein the references are citations to other documents.

24. The method of claim 21, wherein the references are terms contained in other documents.

25. The method of claim 21, wherein the common neighborhood is determined by:

creating a set H of triples (b,c,v) where b, c, and v are vertices;

sampling randomly a subset of H of a specified size into a set H';

creating a set C of points (a,b) that are a projection of a first two elements of each triple in set H';

calculating a number of occurrences, N(a,b), for each pair of vertices within the set C; and

sorting the C nondecreasingly by N(a,b),

wherein the set C of points (a,b) represents the users in a common neighborhood, and the set E of edges represents the activities of the users within the common neighborhood.

26.   The method of claim 25, wherein the random sampling is determined by:

creating an adjaceny list E';

calculating a number of arcs connected to each vertex in a set V of vertices;

calculating a prefix sum of a number of pairs of incident arcs N(a) for each node a up to and including a;

generating random numbers uniformly from a set [1..N];

sorting the generated random numbers into a list R;

initializing a vertex index variable v to 1 and the set H' to the empty set;

512481_1

incrementing the vertex index variable v by 1 until: $N(v-1) < r <= N(v)$ for each random number r in the list R;

selecting a vertex, a, from a set of vertices A(v) connected to vertex v;

selecting a vertex, b, from a set of vertices A(v) – {v} connected to vertex v;

adding a triple (a,b,v) to the set H'; and

determining the set H' when the vertex variable v is greater than a number of nodes N.

27. An apparatus comprising:

means for determining a common neighborhood of users sharing a common activity from a plurality of users; and

means for predicting for a user in the common neighborhood of users a potential activity from the activities of at least one other user in the common neighborhood of users.

28. The apparatus of claim 27, further comprising:

means for prefetching data associated with the potential activity for the user.

29. The apparatus of claim 27, further comprising:

means for recommending an activity to a user that is an activity of a common neighbor of the user.

30. The apparatus of claim 27, wherein the users are associated with internet subscribers and the activities are associated with visits to internet websites.

512481_1

31. The apparatus of claim 30, further comprising:

means for prefetching an internet website for the internet subscriber that a

common neighbor of the internet subscriber has previously visited;

wherein the means for prefetching prefetches the information associated with the

internet website into a cache accessible by an internet service provider of the user.

32. The apparatus of claim 30, further comprising:

means for recommending an internet website to an internet subscriber that a

common neighbor of the internet subscriber has previously visited.

33. The apparatus of claim 30, further comprising:

means for recommending a business service corresponding to an internet web site

visited by a common neighbor of the internet subscriber.

34. The apparatus of claim 27, wherein the users are associated with phone

service subscribers and the activities are associated with phone calls.

35. The apparatus of claim 34, further comprising:

means for recommending to the user a phone service subscribed to by a common

neighbor of the user.

512481_1

36. The apparatus of claim 35, wherein the phone service is selected from the group consisting of: a long-distance calling plan, a local-area calling plan, a cellular calling plan, voice mail, call waiting, call forwarding, internet service, a pager calling plan, call waiting plan and caller ID plan.

37. The apparatus of claim 34, further comprising :

means for recommending a business service to the user based on at least one phone call placed by a common neighbor of the user to a phone number associated with the business service.

38. The apparatus of claim 37, further comprising:

means for providing the user the phone number of the recommended business service.

39. The apparatus of claim 34, further comprising:

means for providing to a business service called by one user of the common neighborhood of users contact information associated with another user of the common neighborhood of users.

40. The apparatus of claim 27, wherein the users are associated with customers and the activities are associated with a plurality of goods or services consumed by the customers.

512481_1

41. The apparatus of claim 40, wherein the common neighborhood of users defines a market segment.

42. The apparatus of claim 40, further comprising:

means for monitoring the communications of a common neighbor of the user; and

means for recommending a business service to the user based on the communications of a common neighbor.

43. The apparatus of claim 27, further comprising:

means for monitoring the activities of the users; and

means for storing the information corresponding to the activities in a memory medium.

44. The apparatus of claim 43, further comprising:

means for updating the information corresponding to the activities in the memory medium.

45. The apparatus of claim 27, wherein the common neighborhood is determined by:

means for creating a set H of triples (b,c,v) where b, c, and v are vertices;

means for sampling randomly a subset of H of a specified size into a set H';

means for creating a set C of points (a,b) that are a projection of a first two elements of each triple in set H';

means for calculating a number of occurrences, N(a,b), for each pair of vertices within the set C; and

means for sorting the C nondecreasingly by N(a,b),

wherein the set C of points (a,b) represents the users in a common neighborhood, and the set E of edges represents the activities of the users within the common neighborhood.

46.   The apparatus of claim 45, wherein the means for sampling randomly comprises:

means for creating an adjaceny list E';

means for calculating a number of arcs connected to each vertex in a set V of vertices;

means for calculating a prefix sum of a number of pairs of incident arcs N(a) for each node a up to and including a;

means for generating random numbers uniformly from a set [1..N];

means for sorting the generated random numbers into a list R;

means for initializing a vertex index variable v to 1 and the set H' to the empty set;

means for incrementing the vertex index variable v by 1 until: $N(v-1) < r <= N(v)$ for each random number r in the list R;

means for selecting a vertex, a, from a set of vertices A(v) connected to vertex v;

means for selecting a vertex, b, from a set of vertices $A(v) - \{v\}$ connected to vertex v;

means for adding a triple (a,b,v) to the set H'; and

means for determining the set H' when the vertex variable v is greater than a

number of nodes N.

47. An apparatus comprising:

means for determining a common neighborhood of documents sharing at least one

common reference; and

means for predicting for a document of the common neighborhood of documents,

a potential reference from the references of at least one other document in the common

neighborhood of documents.

48. The apparatus of claim 47, wherein the documents are technical articles.

49. The apparatus of claim 47, wherein the references are citations to other

documents.

50. The apparatus of claim 47, wherein the references are terms contained in

other documents.

51. The apparatus of claim 47, wherein the common neighborhood is determined

by:

means for creating a set H of triples (b,c,v) where b, c, and v are vertices;

means for sampling randomly a subset of H of a specified size into a set H';

35

means for creating a set C of points (a,b) that are a projection of a first two

elements of each triple in set H';

means for calculating a number of occurrences, N(a,b), for each pair of vertices

within the set C; and

means for sorting the C nondecreasingly by N(a,b),

wherein the set C of points (a,b) represents the users in a common neighborhood,

and the set E of edges represents the activities of the users within the common neighborhood.

52.   The apparatus of claim 51, wherein the means for sampling randomly

comprises:

means for creating an adjaceny list E';

means for calculating a number of arcs connected to each vertex in a set V of

vertices;

means for calculating a prefix sum of a number of pairs of incident arcs N(a) for

each node a up to and including a;

means for generating random numbers uniformly from a set [1..N];

means for sorting the generated random numbers into a list R;

means for initializing a vertex index variable v to 1 and the set H' to the empty

set;

means for incrementing the vertex index variable v by 1 until: N(v-1) < r <= N(v)

for each random number r in the list R;

means for selecting a vertex, a, from a set of vertices A(v) connected to vertex v;

512481_1

means for selecting a vertex, b, from a set of vertices A(v) − {v} connected to vertex v;

means for adding a triple (a,b,v) to the set H'; and

means for determining the set H' when the vertex variable v is greater than a number of nodes N.

53. An apparatus comprising:

memory medium for maintaining information associated with activities of a plurality of users; and

processor for determining a common neighborhood of users sharing a common activity from a plurality of users and predicting for a user in the common neighborhood of users a potential activity from the activities of at least one other user in the common neighborhood of users

54. An apparatus comprising:

memory medium for maintaining information associated with a plurality of documents; and

processor for determining a common neighborhood of documents sharing at least one common reference and predicting for a document of the common neighborhood of documents a potential reference from the references of at least one other document in the common neighborhood of documents.